PERIPHERAL PRINTER
CP-80
Type I

OPERATION MANUAL
SPECIFICATION

C.T.I.

Table of Contents

SECTION A : General Informations 1
1 : Functional Specifications 1
2 : Mechanical Specifications 2
3 : Interface Specifications 2
SECTION B : Preparation For Use 3
1 : Unpacking, Counting The Parts 3
2 : Setting up 3
3 : Install The Ribbon Cartridge 4
4 : Install Selector switches (DIP switch) 5
5 : Cable Connection 7
6 : Set The Wire Rack 7
7 : Installing The Paper 7
8 : Test 9
9 : Print Test 9
10: Connect The Cable To Your Computer For Start 9
SECTION C : Operation 10
1 : Switches And Indicators 11
2 : Buzzer 12
3 : Paper And Detector 12
4 : Self Test 13
5 : Setting Of DIP Switches 13
SECTION D : Control Codes 14
1 : Control Codes In The Text Mode 14
2 : Print Action Codes 15
3 : Paper Formatting Codes 16
4 : Character Disignation Codes 22
5 : Other Codes 27
6 : Control Codes In The Bit Image Mode 28
Appendix A : ASCII Chart 35
Appendix B : Control Codes 36
Appendix C : Control Key Table 39
Appendix D : Print Samples 40
Appendix E : Internal Switches 42
Appendix F : Connector Pin Chart 44
Appendix G : Character Fonts 46

SECTION A
GENERAL INFORMATIONS

This printer is designed to operate through software control, supplied from any general purpose micro-computer, personal computer, office computer, etc. that has provision of printing data out-put that should conform with this specificaiton. It prints upper- and lower-case alpha-numeric characters in both normal and italic letter forms, and graphic characters available on the character code set of this printer beside capability of bit image graphic printing it is also functionated. Additionally, this printer has considerable formatting capability owning to its own internal microprocessor system.

Specifications

1. Functional specifications

Printing method:	Serial impact dot matrix.
Printing format:	Alpha-numeric — 7×8 in 8×9 dot matrix field. Semi-graphic (character graphic) — 7×8 dot matrix. Bit image graphic — Vertical 8 dots parallel, horizontal 640 dots serial/line.
Charactr size:	2.1mm (0.083″)-W×2.4mm (0.09″)-H/7×8 dot matrix.
Character set:	228 ASCII characters; Normal and italic alpha-numeric fonts, symbols and semi-graphics.
Printing speed:	80 CPS, 640 dots/line per second.
Line feed time:	Approximately 200 msec at 4.23mm (1/6″) line feed.
Printing direction:	Normal — Bidirectional, logic seeking. Superscript and bit image graphics — Unidirectional, left to right.
Dot graphics density:	Normal — 640 dots/190.5mm (7.5″) line horizontal. Compressed characters — 1,280 dots/190mm (7.5″) line horizontal.
Line spacing:	Normal — 4.23mm (1/6″). Programable in increments of 0.35mm (1/72″) and 0.118mm (1/216″).
Columns/line:	Normal size — 80 columns Double width — 40 columns Compressed print — 142 columns Compressed/double width — 71 columns The aboves can be mixed in a line.
Paper feed:	Adjustable sprocket feed and friction feed.
Paper type:	Fanfold. Single sheet. thickness — 0.05mm (0.002″) to 0.25mm (0.01″). Paper width — 101.6mm (4″) to 254mm (10″).
Number of copies:	Original plus 3 coipies by normal thcikness paper.

2. Mechanical specifications

Ribbon:	Cartridge ribbon (exclusive use), black.
MTBF:	5 million lines (excluding print head life)
Print head life:	Approximately 30 million characters (replaceable).
Dimensions:	377mm (14.8″)-W×295mm (11.6″)-D×125mm (4.9″)-H incl. sprocket cover.
Weight:	Approximate 5.3 Kg. (11 lbs)
Power requirement:	100 VA max.
Temperature:	Operating — 5 to 40 degree C (41 to 104 degree F). Storage — minus 30 to 70 degree C (−22 to 158 degree F).
Humidity:	Operating — 5 to 90 percent RH, no condensation. Storage — 0 to 95 percent RH, no condensation.
Shock:	Operating — 1 G (less than 1 msec.)
Vibration:	Operating — 0.25 G, 55 Hz. max. Storage — 0.5 G, 55 Hz. max.
Insulation resistance:	10 Meg ohm between AC power line and chassis.
Dielectric strength:	Between AC power line and chassis, AC 1 KV (RMS) 50 Hz. or 60 Hz. during one minute and no abnormal condition shall be observed.

3. Interface specifications

Interface:	Standard Centronics parallel. Optional RS-232C. (SERIAL)
Data transfer rate:	4,000 CPS max.
Synchronization:	By external supplied STROBE pulses.
Handshaking:	By ACKNLG or BUSY signals.
Logic level:	Input data and all interface control signals are TTL level.

SECTION B
PREPARATION FOR USE

Unpacking, counting the parts.

Before you unpack your printer, inspect the carton for signe of damage. If it appears to be damaged, be especially careful when you inspect its contents. The package should contain following — Ref. **Figure 1.**

1. This user's manual
2. Printer unit, Model **CP-80 Type I**
3. Ribbon cartridge
4. Paper guide wire rack
5. Miscellaneous informational literature

If any of the first 4 is missing or damaged notify your dealer immediately.

Note: You also need a cable to connect the printer to your particular computer. You should obtain the appropriate cable which is compatible with the cable to use for CP-80 Type I type printer with your particular computer, from your dealer.
If you use a non-standard type cable, make sure it is wired properly refering **Appendix C.**

Setting up

Before starting to use your printer, you should make sure that it is in working properly. This procedure includes checking for obstructions in the path of the printer head or paper feed and that the printer ribbon is properly in place. Follow this procedure.

1. Lift and remove the plstic top cover to expose print head and mechanism.
2. Remove shipping screw(s).
   Carefully lift front of printer unit and make it stands as the bottom of case be vartically face to you and hold the unit by the one of your hand on the soft surface — see **Figure 2.** Then, remove the shipping screw(s) with a Phillips-head screw driver. After it is removed, gently back the unit to lay flat on a firm surface, position the printer front be face to you.

Figure 1
Checking contents of carton.

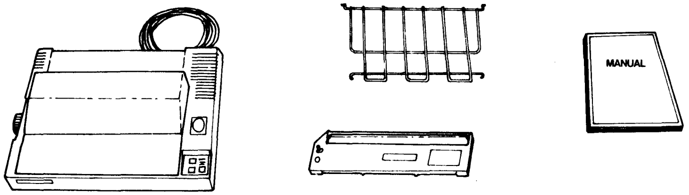
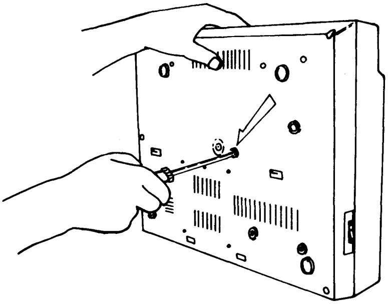


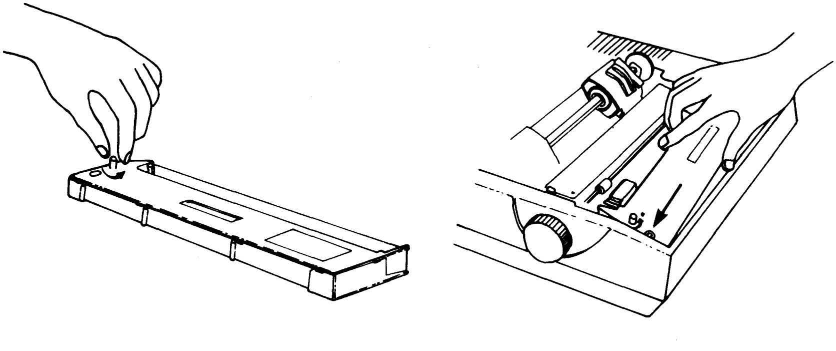
Figure 2
Remove shipping screw(s)

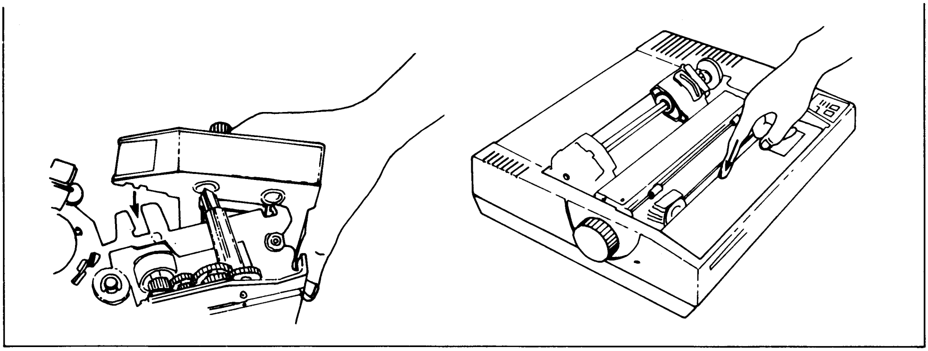


3. Install the ribbon cartridge in the manner of followings – see **Figure 3.**

a. Remove the ribbon cartridge from its box and turn the plastic knob counterclock wise so the ribbon is tight.
b. Move the printer head to the left by finger if it is located not at home position that is the far left.
c. Hold the cartridge with the plastic knob be at left and top side, then set it on the two side frames of printer mechanism with tilting the cartridge so the two front hooks on the side frames be engaged with two catches on both left and right sides of bottom of cartridge, then steer down with pressing the ribbon side so the two side tabs of cartridge be slided into the slits on the side frames of printer mechanism.
d. Turn the plastic knob on cartridge again to tighten the ribbon up so the ribbon slips into front of printer head by it-self.

Figure 3
Installation of ribbon cartridge





4. Internal selector switches (DIP switch).

There are 12 different switches inside the printer case, they can be set to make the printer functions wide variety of print features — see **Appendix E.**

To get the switches, the case has to be opened in the manner of followings — see **Figure 4 & 5.**

CAUTION: Please, refer to SECTION C, 5. before open case. Any time you attempt to open the case, the power line must be disconnected.

a. Remove the ribbon cartridge.
b. Remove the platen knob by pulling straight out, with firm steady pressure.
c. Locate the unit on the top of table with the portion of case screw be outside of table edge so can use the screw driver from bottom side of case, one screw at a time, remove the screw then with repositionning the case remove the all screws one by one.
d. Hold the both side of upper case and gently lift and push back towards back and upper way so the portion of case below the tractor mechanism got by the tractor blocks — to make it easy, move the right side tractor block to left as far as it can be pushed over.

Figure 4.
Remove case screws.

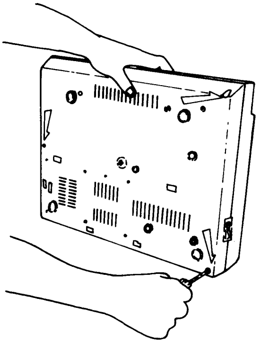


Figure 5.
Open the case.

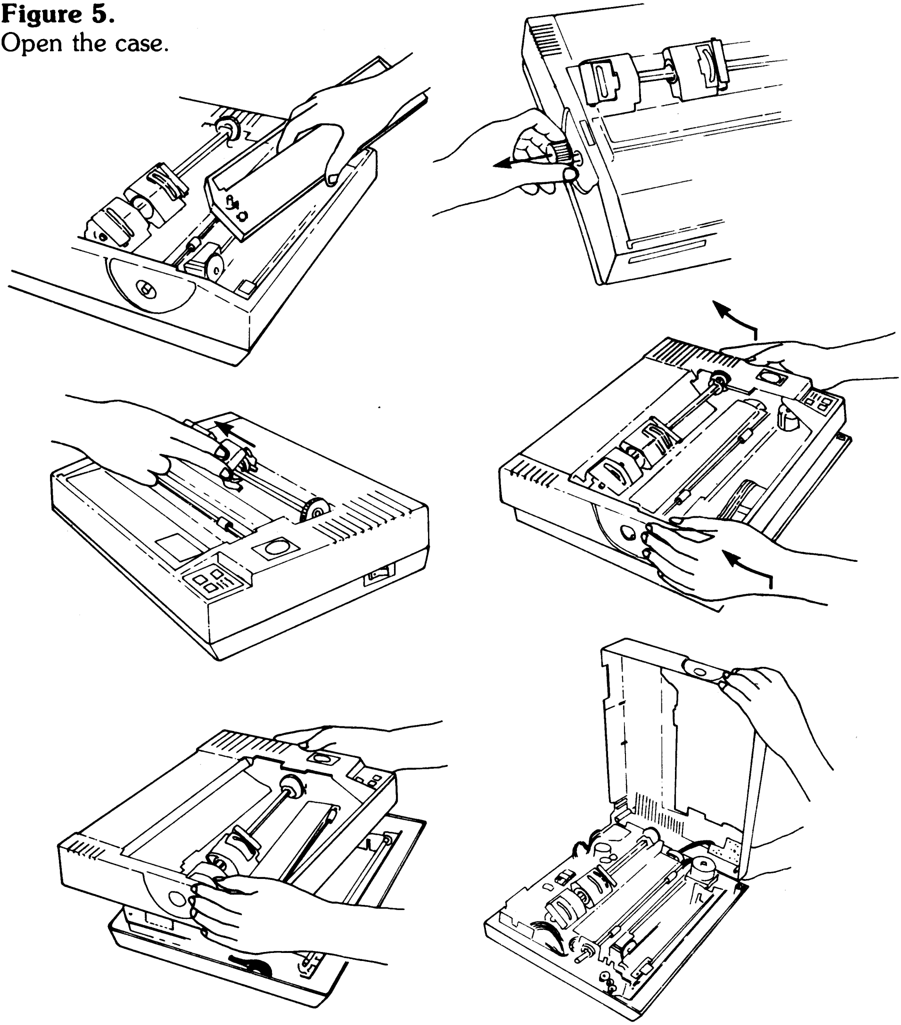
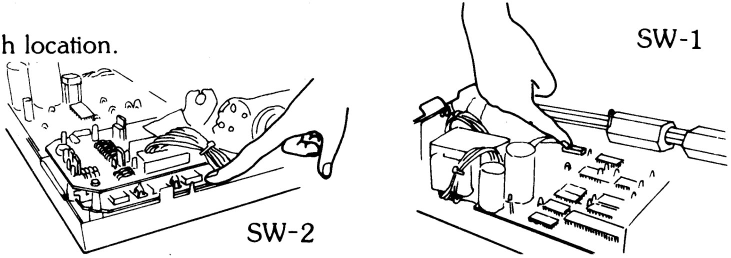


Figure 6.
Internal switch location.



Caution: There are the lead wires connecting the key switch portion of upper case to the main electronic circuit board on bottom case, so after the upper case has been removed, do not it too far away as to strain the lead wires.

e. Then, taking treat care, tip the upper case gently to the right so it can lie to the side of unit.
f. The circuit boards are now exposed to you. Refering **Figure 6,** locate the selection switches.
g. With refering **Appendix E**, set the switches.
h. Reversing above procedures, put the case back together and tighten the screws. The printer case assembles the same way it as disassembled.

5. Cable connection.

Before connect the cable, be sure the computer and the printer are turned OFF. Follow these steps to connect your printer to your computer — see **Figure 7.**

a. Place the printer in a convenient location close to the computer.
b. Be sure you have the right cable and connect it on to the receptacle of connecter on back of printer unit. Double-check to ensure that the cable is in place and locked. It may take a firm puch on the connecter to secure the clips.
   The other end of cable should not yet be connected to your computer at this stage.

6. Set the wire rack.

As shown on **Figure 8**, set the wire rack which is a paper separator, it allows the paper to feed smoothly into and out of the printer.

7. Installing the paper — see Figure 9.

a. Position the paper on the floor behind and below the printer.
b. Pull the paper release lever and paper bail toward you.
c. Feed the incoming paper above the wire guide of rack but below the wire frame, into the slot and right on around to the tractors. Move the tractors as necessarry to match the paper hole spacing. Open both tractor covers.
d. Position the paper holes on top of the tractor teeth and close the covers. Adjust one or both tractors so the paper is entered as you wish it, and is hold firmly in place.

Figure 7.
Connecter and Cable

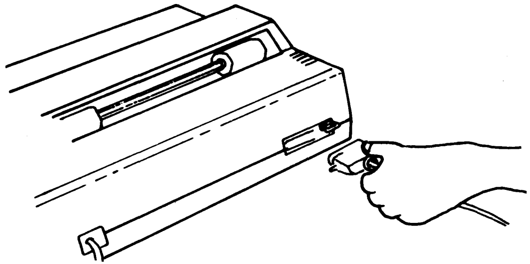


Figure 8.
Wire rack

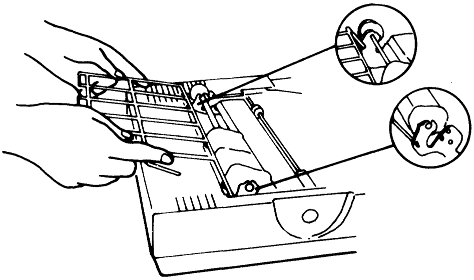
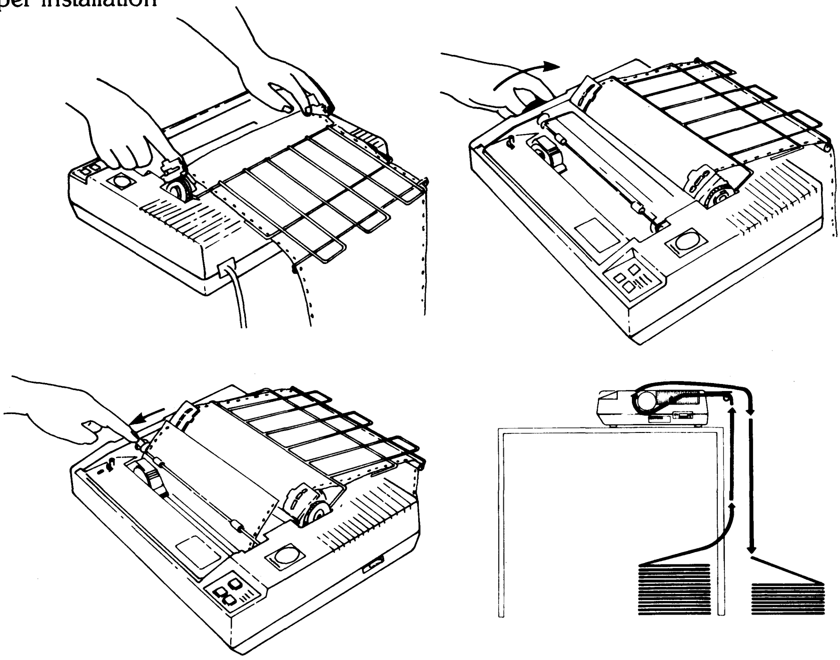


Figure 9.
Paper installation



e. Feed the paper forward with the platen knob.

f. Set the paper so a perforation between sheets is positioned just slightly below the top of the ribbon.

g. Adjust head positioning for print image if necessarry, after made print test. At this stage, just acknowledge the location of adjusting lever but should not touch the adjustment that should been made by factory. — Refer **Figure 10.**

Note: While using the tractor for paper feed the release lever should be kept in the RELEASE position.

8. Test — see Keyboard Layout Figure 11.

a. Plug the power cord in.
b. Turn the power switch ON.
c. POWER, READY and ON LINE lights should be lit. If the paper is not correctly inserted PAPER OUT light will also lit, then reinstall the paper.
d. Press the ON LINE button several times, it toggle the ON LINE and READY lights. When those lights are ON, your printer is ready to accept datas from the host computer.
e. Try press the FF (form feed) and LF (line feed) buttons, those are in active only when the printer is OFF-Line condition (ON LINE light is not lit).

9. Print test.

a. Turn the power switch OFF.
b. Hold the LF button down and turn the power switch back to ON at same time. It prints the all content of character set, it will continue as long as you hold the LF button down.

Note: The test print will be made as 80 characters/line width, so must use full size paper.

10. Connect the cable to your computer for start.

Figure 10.
Positioning of printer head

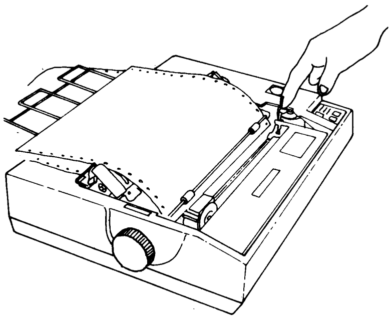
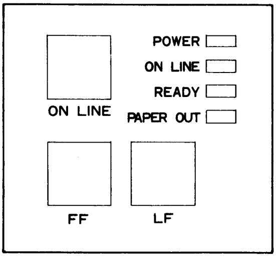


Figure 11.
Keyboard layout



SECTION C
OPERATION

Definitions of some terms often used.
Before looking at the printer in detail, some terms should be defined first so that you can understand them more easily and in less time. They are:
ASCII code
Escape codes
" + " symbol
2, D and H
If you are already familiar with the above terms, skip the following.

ASCII code.
Characters in computer systems are represented by groups of bits. The various groups of bits that represent the set of characters that are the "alphabet" of any given system are called a "coding system," or simply "code". Codes for representing the information vary in relation to both the number of bits used to define a single character in the assignment of bit patterns to each particular character.
The sending and receiving equipment must be programmed to acknowledge the code used in computer systems.
The **CP-80 Type I** has character set of 96 in normal font, 96 in italic font and control codes. In addition it has 32 semi-graphic fonts so you can assemble the graphic drawing by using codes — see **Appendix A**, those characters are put in some addresses of the ASCII code table instead of the standard characters.
All those can be accessed by a particular control code (or the Dip switch).
The selection of which one to use is up to you if your host computer has an 8-bit data bus line.

Escape codes.
In a lot of control codes that the Printer has, you might be confused by the word "Escape". Some alphabetical letters and some numbers follow it. Each of them causes a special function to the printer i.e.

(1) To format a sentence.
(2) To do emphasized printing.
(3) To select paper end detector programmably.
(4) To set column length.
(5) To underline characters.
(6) To print superscript/subscript characters.
(7) To do bit image printing.
(8) Others.

Generally, printer control codes, especially like "Escape" i.e. CHR$ (27) are not standarized. Every computer and printer manufacturer applies its own meaning to such codes.
The "Escape" codes used in the printer should not confused with the "Escape" key which some computers have — so familiarize yourself with these control codes.

" + " symbol

You will often see " + " symbol in the explanation or description of control codes in this manual.

This symbol is used for legibility only and may not be input in your actual program.

2. D (or Dec.) and H (or Hex.)

(   ) 2. (   ) D and <   > H respectively represent binary, decimal and hexadecimal numbers.

1. Switches and indicators.

There are three switches and four indicators on the control panel and one power switch on the right side of the printer case. Acknowledge its locations to become familiar with operation of printer — see **Figure 11.**

a. Power switch: Controls primary AC power to the printer. Check the paper is properly set in the printer before turning this switch.

b. ON LINE switch: When the power switch is turned on the printer enters the On-line mode and can be utilized in conjunction with a host computer.

Depressing the On-line switch will set the printer in the Off-line mode and cause the green light to go out, it toggle the mode from On-line to Off-line to On-line alternatively.

The switch does not function while the printer is actively engaged in printing.

The printer is automatically placed Off-line if the paper supply is exhausted or if a mechanical error occurs in the printer.

The operation of the line feed and form feed switches are effective only while the printer is Off-line mode.

c. FF switch: (form feed) When this switch is depressed once, the paper is advanced vertically to the next top of form position. This switch must be depressed while the printer is Off-line mode.

The top of form position is initialized when the power switch is turned on, when $\overline{\text{INIT}}$ signal is applied to the interface connector, or when the ESC @ code is input. Therefore, before turning the power switch on to start operation, set the paper at the appropriate top of form position.

d. LF switch: (line feed) The paper advances while this switch is being depressed. The line spacing is determined by ESC A + (n)D code.

The line feed operation is prohibited while the printer is actively engaged in printing.

e. Indicators:

POWER — Illuminates while the AC power is on.

READY — Illuminates when the printer is ready to accept data.

ON LINE — Illuminates when the printer is in the On-line mode.

PAPER OUT — Illuminates when the paper supply is near its end.

2. Buzzer.

The buzzer is located inside the printer, and sounds for about 0.3 second when the printer receives BEL code CHR$(7), and also when the paper supply is near its end.

3. Paper end detector.

a. When the paper end detector (sensing switch located on the paper guide) detects that the paper is nearly exhausted, the signals on the interface connector change to the following status, and the printing oepration stops.

Signal	Pin No.	Status
ERROR	32	"LOW" level
PE(Paper end)	12	"HIGH" level
BUSY	11	"HIGH" level
ACKNLG	10	No signal is output

To reactivate the printing, take the following procedure as shown in **Fig. 12.**

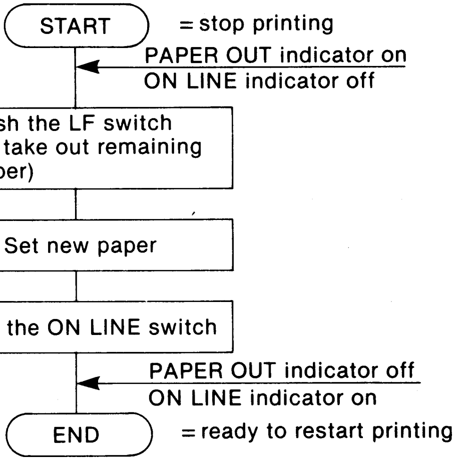


Figure 12. Flowchart of paper out status release procedure.

b. When the printer falls into paper-out status, it is automatically put in the OFF-LINE state and paper advancement can be performed by depressing the LF switch. After setting new paper in the printer, depress the ON LINE switch to that the printer may resume operation.

c. There is another way to start the printer, again when it falls into paper-out status, set new paper in the printer and turn the power switch off and on again, or apply the $\overline{\text{INIT}}$ signal. In this case, all previously established datas are cancelled.

d. The paper end detecting function is useful to prevent erroneous printing when the printer is out of paper. If printing of characters up to the last line is to be continued, the paper end detecting function may be made invalid by either of the following two methods.
  (1) Set the DIP switch pin 1—3 to the ON position, and the paper end detecting function will become invalid.
  (2) Enter control code "ESC 8" and the paper end detecting function will become invalid.

4. Self test.

The **CP-80 Type I** has a self test function.
The self-test function is pre-programmed and can be performed by turning the power switch on while depressing the LF switch. All characters provided by the internal software are printed out by this operation.

Notes: To check all interface logic including the interface connector, proceed as follows:
(1) Connect $\overline{\text{ACKNLG}}$ signal (pin No. 10) to $\overline{\text{STROBE}}$ signal (pin No. 1) with a lead wire.
(2) Turn the DIP switch 2—3 to ON to effect auto-line feed.
(3) Set the adequate ASCII code data to be printed. To obtain low logic level signals, connect the data transfer line required for printing (pin Nos. 2 to 9) to GND level (pin No. 33, etc.).
Example of printing "Z"   "Z" = (90)D = (01011010)
in this case, connect pin Nos. 2, 4, 7 and 9 to pin No. 33.

5. Setting of DIP switches. Refer to Appendix E.

In order to suit the user's specific requirements, desired control modes are selectable by the two built-in DIP switches. The DIP switches (SW1 and SW2) located on the main circuit board are shown in **Fig. 6.** Internal switch location.

Note: The most of functions selectable by DIP switches can also be selected by control codes, so be sure it is desirable to set DIP switch before open the case.

SECTION D
CONTROL CODES

1. Control codes in the text mode.

With the **CP-80 Type I**, two standard operation modes are available. One is the Text Mode which prints corresponding characters on normal ASCII coded inputs, and the other, the Bit Image Mode which permits printing of pictures and images in dot configurations. The Text Mode is described in this section while the Bit Image Mode is covered in the following section.
The **CP-80 type I** has been designed as a terminal unit capable of various software controls. When control codes are transferred to the printer, respective functions governed by these codes such as form feed, line feed, etc. are excuted immediately. In order to permit the printer to fully exhibit these functions, careful reading and thorough understanding of the following control codes are recommended. In this section, first the control codes in test mode are classified into groups. These two modes are not fully independent of each other in that parameters set in the Text Mode are also effective in the Bit Image.

a. Print action codes.

CR	Carriage return
LF (or VT)	Line feed
FF	Form feed

b. Paper formatting control codes.

ESC D, HT	Tabulation
ESC Q	Column length
ESC 0, ESC 1, ESC 2, ESC 3 + n, ESC A, ESC J	Line spacing
ESC C, FF	Form length, form feed
ESC N, ESC O	Skip-over perforation

c. Character designation codes.

SO, ESC W, DC 4	Enlarged character printing
SI, DC 2	Condensed character printing
ESC E, ESC F	Emphasized character printing
ESC G, ESC H	Double printing
ESC S, ESC T	Subscript/superscript printing
ESC – (minus)	Underline printing

d. Other codes.

ESC @	Printer initialization
ESC 8, ESC 9	Selection or deselection of the paper end detector
BEL	Buzzer
BS	Back space
DEL	Delete
NUL	Null
ESC K, ESC L	Access code to Bit Image mode

ESC U	Unidirectional printing set, reset
ESC #	Accept eighth bit "as is" from computer
ESC 4	Italic character set ON
ESC 5	Italic character set OFF
ESC <	One line unidirectional print. Prints current line only from left to right.
ESC =	Clears eighth bit. (i.e. sets to zero.)
ESC >	Sets eighth bit to 1.

2. Print action codes.

a. **CR (carriage return)**

When the CR code is transmitted to the print buffer, all data stored in the print buffer is printed. When $\overline{\text{AUTO FEED XT}}$ (pin No. 14 of the interface connector) is at "LOW" level, the paper is advanced one line automatically after the executioon of printing by the CR code.

Notes: (1) When 80 columns of print data (including spaces) are continuously received and the following data is valid and printable, the printer automatically begins to print the data stored in the print buffer. (In this case, if $\overline{\text{AUTO FEED XT}}$ is at "LOW" level, the paper is advanced one line after printing.)

(2) If no data procedes the CR code, or if all preceding data is SPACE, the carriage assembly does not operate. Under this condition, if $\overline{\text{AUTO FEED XT}}$ is at "LOW" level, only the paper is advanced one line.

(3) When all 80 columns of data are SPACE, the carriage assembly does not operate. Under this condition, if $\overline{\text{AUTO FEED XT}}$ is at "LOW" level, or if the DIP switch pin 2—3 on the main circuit board is ON, only paper feeding is performed.

b. LF (line feed) or VT (vertical tabulation — functions same as LF)

When the LF code is input, all data in the print buffer is printed and the paper is advanced one line If no data precedes the LF code, or if all preceding data is SPACE, only paper feeding is performed. For example, if the data is transferred in the order of DATA → CR → LF, data will be printed by the CR code, and when the printer receives LF code, it only carries out one line feed, because no print data precedes the LF code.

c. FF (form feed)

The FF code causes the printer to execute the printing of all data stored in the print buffer and advances the paper to the next predetermined top of form position.

Notes: (1) The top of form is determined when the power switch is turned on or the $\overline{\text{INIT}}$ signal is applied, or when the ESC@ code is input.

(2) If the form length per page is not set, one page length of form is regarded as 66 lines set in the ON position.

(3) The form length can be set by ESC C + (n)D or ESC C + (0)D + m as described in this manual.

3. Paper formatting codes.

a. HT (horizontal tabulation)

The HT code carries out the horizontal tabulation to a predetermined position set by "ESC D" (up to 28 positions). In the absence of any predetermined HT position, the HT code will be ignored. In enlarged character mode, two non-enlarged characters correspond to one enlarged character.

b. ESC D + n1 + n2 + ... + nk + NUL

(1 ≤ (n)D ≤ 142, k ≤ 28)

This code specifies the horizontal tab stop position. "n" denotes column position where the print head stops. The first 28 tab stops per line are recognized in the printer, and subsequent tab stops are ignored. The tab stop positions can be specified up to 80 columns in normal character mode and 142 columns in condensed character mode. The excess tab positions set by the DIP switch or this code will be ignored.

1 ≤ n ≤ 80 in normal character mode

1 ≤ n ≤ 142 in condensed character mode

In enlarged character mode, two non-enlarged characters must be set as one character. The NUL code should be input as the command for the termination of the tab set sequence, and the lack of this code will cause incorrect data printout.

[PROGRAM]

```
00 LPRINT CHR$(27);"D";CHR$(5);CHR$(10);CHR$(21);
   CHR$(0);
10 LPRINT "ABC";CHR$(9);"DEF";CHR$(9);"GHI";
   CHR$(9);"JKL"
```

[PRINT]

```
ABC  DEF        GHI        JKL
```

c. ESC Q + (n)D

The print column width can be specified by inputting ESC Q + (n)D code ($1 \le n \le 142$). "n" represents the print column width to be specified in each character size. The Printer will ignore the improper setting of n value.

$1 \le n \le 80$	normal character and emphasized character
$1 \le n \le 142$	condensed character
$1 \le n \le 40$	enlarged character
$1 \le n \le 71$	enlarged-condensed character

[PROGRAM EX.]

```
00 LPRINT "ESC Q+N"
10 FOR I=1 TO 8
20 LPRINT "PRINT WIDTH";I;"COLUMNS"
30 LPRINT CHR$(27);"Q";CHR$(I);
40 GOSUB 90
50 LPRINT CHR$(27);"Q";CHR$(80)
60 NEXT I
80 STOP
90 FOR N=1 TO I*2
92 LPRINT "-";
94 NEXT N
98 RETURN
```

[PRINT]

```
ESC Q+N
PRINT WIDTH 1 COLUMNS       PRINT WIDTH 5 COLUMNS
-                           -----
-                           -----
PRINT WIDTH 2 COLUMNS       PRINT WIDTH 6 COLUMNS
--                          ------
--                          ------
PRINT WIDTH 3 COLUMNS       PRINT WIDTH 7 COLUMNS
---                         -------
---                         -------
PRINT WIDTH 4 COLUMNS       PRINT WIDTH 8 COLUMNS
----                        --------
----                        --------
```

d. ESC A + (n)D (for setting amount of line spacing)

This code specified the amount of line spacing in the Line Feed, provided that (n)D must satisfy the condition: 1 ≤ (n)D ≤ 85 (Decimal). "n" = 1 is equivalent to 1/72 inch paper advancement. Since the distance between any two dot wires of the print head is 1/72 inch, any line spacing in increments proportional to the distance between the dot wires can be established.

Notes: (1) When the POWER switch is turned on or INIT signal is applied to the pin No. 31 of the interface connector, the line spacing is set at 1/6 inch.

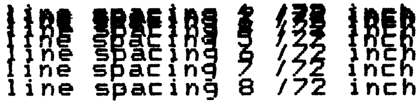
(2) The ESCA + (n)D code may be input at any position on a line. However, once the code is input, the specified amount of line spacing will remain unchanged until a code for new line spacing is set.

[PROGRAM EX]

```
200 LPRINT "ESC A+N"
220 FOR J=1 TO 8
230 LPRINT CHR$(27);"A";CHR$(J);
240 LPRINT "line spacing";J;"/72 inch"
250 NEXT J
255 LPRINT CHR$(27);"2"
258 LPRINT
```

[PRINT]

```
ESC A+N
```



```
line spacing 5 /72 inch
line spacing 6 /72 inch
line spacing 7 /72 inch
line spacing 8 /72 inch
```

Note: < How to input "n" >

When "n" is actually transferred to the Printer as data, it is transferred in the form of a 7-bit binary number. In case of "ESC A + (24)D" to specify the amount of line spacing at 24/72 = 1/3 inch (24 = (00011000)2), actual output to the Printer is performed as (27)D (65)D (24)D in Decimal code. Keep in mind that the method of input from the keyboard of a host computer is different, for which refer to the specifications of your host computer.

- **Example:** Input from the keyboard of the TRS-80 personal computer.
  [PRINT CHR$(27); CHR$(65); CHR$(24)]

e. ESC 0

Input of the ESC 0 code causes the subsequent line spacing to be set at 1/8 inch.

[PROGRAM EX.]

```
1200 LPRINT "ESC 0"
1210 LPRINT CHR$(27);"0";
1220 FOR N=1 TO 6
1230 LPRINT "LINE SPACING 1/8 INCH"
1240 NEXT N
1250 LPRINT CHR$(27);"2"
```

[PRINT]

```
ESC 0
LINE SPACING 1/8 INCH
LINE SPACING 1/8 INCH
LINE SPACING 1/8 INCH
LINE SPACING 1/8 INCH
LINE SPACING 1/8 INCH
LINE SPACING 1/8 INCH
```

f. ESC 1

Input of the ESC 1 code causes the subsequent line spacing to be set at 7/72 inch.

[PROGRAM EX.]

```
00 LPRINT "ESC 1"
10 LPRINT CHR$(27);"1";
20 FOR N=1 TO 6
30 LPRINT "LINE SPACING 7/72 INCH"
40 NEXT N
50 LPRINT CHR$(27);"2"
```

[PRINT]

```
ESC 1
LINE SPACING 7/72 INCH
LINE SPACING 7/72 INCH
LINE SPACING 7/72 INCH
LINE SPACING 7/72 INCH
LINE SPACING 7/72 INCH
LINE SPACING 7/72 INCH
```

g. ESC 2
Input of the ESC 2 code causes the subsequent line spacing to be set at 1/6 inch.

h. ESC 3 + (n)D (1 ≤ n ≤ 255)
Input of the ESC 3 + (n)D code causes the subsequent line spacing to be set at n/216 inch.
With n = 1 and n = 2, paper feeding accuracy is not guaranteed. If the value of n is set as 0, this setting is ignored and the value of n set immediately before this code becomes valid.

[PROGRAM EX.]

```
60 LPRINT "ESC 3+N"
80 FOR N=10 TO 20
90 LPRINT CHR$(27);"3";CHR$(N);
100 LPRINT "line spacing";N;"/216 inch"
110 NEXT N
115 LPRINT CHR$(27);"2"
118 LPRINT
```

[PRINT]

```
ESC 3+N
line spacing 10 /216 inch
line spacing 11 /216 inch
line spacing 12 /216 inch
line spacing 13 /216 inch
line spacing 14 /216 inch
line spacing 15 /216 inch
line spacing 16 /216 inch
line spacing 17 /216 inch
line spacing 18 /216 inch
line spacing 19 /216 inch
line spacing 20 /216 inch
```

i. FF **(Form Feed)**
See paragraph 2, C

j. ESC C + (n)D (n ≠ 0), ESC C + (0)D + m **(for setting form length)**
The "ESC C + (n)D" code specifies the form length which is determined by the number of lines (n: 1 ≤ (n)D ≤ 127 where the value of "n" is a positive number and must not exceed 127 lines). In other words, the maximum form length is 127 lines. The amount of line spacing when this code is input is a predetermined numerical value by ESC A + (n)D. When the form length is not programmed by the FSC C + (n)D code, one page is assumed as 66 lines.
The "ESC C + (0)D + m" code specifies the absolute quantity of form length in units of inches (1 ≤ (m)D ≤ 22). Therefore, even if the amount of line spacing is changed on the page, the absolute quantity of form length remains unchanged. "m" denotes the form length in inches. If the value of m is set as 0, this setting is ignored and the value of m set immediately before it becomes valid.

Notes: (1) With the ESC C + (n)D code, the form length can be defined by the number of lines using the amount of line spacing set by the ESC A + (n)D code. With the ESC C + (0)D + m code, the form length can be defined as an absolute quantity in unit of inches.

(2) Input of "ESC C" code cancels, the skipover perforation set by "ESC N."

(3) (0)D denote decimal 0 and <0>H, hexadecimal 00.

k. ESC N + (n)D (n ≠ 0) (for setting skip-over perforation)

The ESC N + (n)D code is used to set the skip-over perforation function, which specifies the number of lines "n" to be skipped at the bottom of a page (n: 1 ≤ (n)D ≤ 127 where the value of n is positive number). For example, if the last three lines of a page is to be skipped, the value of n must be entered as "3." If the value of n set is greater than the form length specified by the ESC C + (n)D code, skip-over perforation is executed up to the first line of the next page after one line printing. If the value of n is set as 0, this setting is ignored and the value of n set immediately before it becomes valid.

When the current form length is changed by the input of the ESC C + (n)D or ESC C + (n)D + m code again, the amount of skip-over perforation previously set is cancelled. In this case, therefore, the ESC N + (n)D code must be input again to set the amount of skip-over perforation. When the DIP switch pin 2—4 on the man circuit board is ON, skip-over perforation for 1 inch is executed.

(Example) -line skip-over perforation

[PROGRAM EX.]

```
1800 LPRINT CHR$(27);"C";CHR$(4);
1810 LPRINT CHR$(27);"N";CHR$(2);
1820 FOR N=1 TO 6
1830 LPRINT "2 LINE SKIP PERFORRATION"
1840 NEXT N
1880 LPRINT CHR$(27);"C";CHR$(66)
```

[PRINT]

```
2 LINE SKIP PERFORRATION
2 LINE SKIP PERFORRATION  ———————— end of previous page
                                  |
                                  |  skip  perforation
                                  ↓
2 LINE SKIP PERFORRATION  ———————— Top of form position
2 LINE SKIP PERFORRATION



2 LINE SKIP PERFORRATION
2 LINE SKIP PERFORRATION
```

l. ESC O

This code cancels the skip-over perforation set by the ESC N + (n)D code.

m. ESC J + (n)D (Paper Feed Execution Command) (1 ≤ n ≤ 255)

This dode causes the printer to execute paper feeding by n/216 inch. With n = 1 and n = 2. paper feeding accuracy is not guaranteed. If the value of n is set as 0. no paper feeding will be executed. In any case, the set value of n will not remain in the memory.

[PROGRAM EX.]

```
1700 LPRINT CHR$(14);"ESC J+N"
1710 FOR N=10 TO 25
1720 LPRINT "---------";CHR$(13);CHR$(27);"J";
     CHR$(N);"---------";N
1730 NEXT N
```

[PRINT]

```
                        ---------
ESC  J+N                --------- 18
---------               ---------
--------- 10            --------- 19
---------               ---------
--------- 11            --------- 20
---------               ---------
--------- 12            --------- 21
---------               ---------
--------- 13            --------- 22
---------               ---------
--------- 14            --------- 23
---------               ---------
--------- 15            --------- 24
---------               ---------
--------- 16            --------- 25
---------
--------- 17
```

4. Character designation codes

a. SO **(Shift Out) (for enlarged characters)**

When the SO code is input, all data that follows this code on the same line will be printed out in double-width enlarged characters. This code is cancelled by the line feed or the input of "DC 4" code and can be input at any column position on a line. Therefore, normal size and enlarged characters can be mixed on the same line.

Note: With normal size and enlarged characters mixed on the same line, when any enlarged character is at the 80th column position in terms of normal size character, this position becomes the end position of the line (i.e., "Print Buffer Full" position).

[PROGRAM EX.]

```
24 LPRINT "ABCD";CHR$(&HE);"EFGH";CHR$(&HD);
26 LPRINT "IJKL";CHR$(&HE);"MNOP"
```

[PRINT]

```
ABCDEFGH

IJKLMNOP
```

b. SI (Shift In) (for condensed characters)

When the SI code is input, all data stored in the buffer is printed and the following data will be printed out in condensed characters. This code is cancelled by the input of "DC 2" code. The SI code can be input at any column position on a line. When printing condensed characters, the data capacity of the print buffer will become 142 columns per line (in terms of condensed size character). When the SO code is received after the input of the SI code, condensed enlarged characters (double width of condensed characters) can be printed. this condition is cancelled by "DC 4" code or LF code, and the character size returns to "condensed."

[PROGRAM EX.]

```
30 LPRINT CHR$(&HF);"ABCDEFGHIJKLMN"
32 LPRINT CHR$(18)
```

[PRINT]

```
ABCDEFGHIJKLMN
```

c. DC 4 (Device Control 4)

The DC 4 code cancels the SO mode (enlarged character printing function).

[PROGRAM EX.]

```
20 LPRINT "ABCD";CHR$(&HE);"EFG";CHR$(&H14);"HIJ"
```

[PRINT]

```
ABCDEFGHIJ
```

[PROGRAM EX.]

```
46 LPRINT CHR$(&HF);"ABCDEF";CHR$(&HE);"GHI";
   CHR$(&HD);CHR$(&HA)
48 LPRINT CHR$(18);"JKLMN"
```

[PRINT]

```
ABCDEFGHI


JKLMN
```

d. ESC E **(for emphasized characters)**

When the ESC E code is input, all the data stored in the print buffer will be printed out and the data following this code will be printed in emphasized characters. Emphasized character printing gives the character a stronger impression on the paper.

This code can be input at any column position on a line. The speed of the head carriage reduces to 50 CPS while printing emphasized characters.

e. ESC F

The ESC F code cancels the emphasized character printing mode.

[PROGRAM EX.]

```
00 A$=CHR$(27)
10 LPRINT A$;"E";"ABCDE";A$;"F";"FGHIJ";CHR$(&HD);
   CHR$(&HA)
20 LPRINT CHR$(15);"ABCD";A$;"E";"EFGH";
   A$;"F";"IJKL";CHR$(18);CHR$(&HD);CHR$(&HA)
30 LPRINT CHR$(14);"ABCD";A$;"E";"EFGH";
   A$;"F";"IJKL"
```

[PRINT]

```
ABCDEFGHIJ

ABCDEFGHIJKL

ABCDEFGHIJKL
```

f. ESC G **(for double printed characters]**
When the ESC G code is input, all the data stored in the printer buffer will be printed out and the data following this code will be printed in double print character mode. In this mode, the printer will complete one line of printing by two passes of the print head while advancing the paper by about 1/216 inch between the first pass and the second pass. For this reason, the **CP-80 Type I** performs paper feeding adjustment to maintain the absolute length and number of lines of a page. However, if any data are printed in this mode as a result of the BUFFER FULL condition, the printer will not perform this adjustment. Therefore, the form length of a page on which the printing resulting from the BUFFER FULL condition is performed will become different from that initially set for the page.

g. ESC H
The ESC H code cancels the double print character mode.

[PROGRAM EX.]

```
1600 LPRINT CHR$(27);"G";"ABCDE";CHR$(&HD);CHR$(&HA)
1610 LPRINT "FGHIJ";CHR$(27);"H";"KLMNO"
```

[PRINT]

```
ABCDE

FGHIJKLMNO
```

h. ESC S + (n)D (for superscript and subscript characters) (n = 0 or 1)
When the ESC S + (0)D code is input, all the data stored in the print buffer will be printed out and the data following this code will be printed in superscript character mode. In this mode, a character measuring 2.0(W) x 1.2(H)mm will be printed at the upper half of a line. When the ESC S + (1)D code is input, all the data stored in the print buffer will be printed out and the data following this code will be printed in subscript character mode. In this mode, a character will be printed at the lower half of a line.

In both the superscript and subscript character modes, the printer will perform unidirectional, double character printing. After the first pass of the print head, the paper will be advanced by 1/216 inch and a character will be formed on completion of the second pass. For this reason, the **CP-80 Type I** will perform paper feeding adjustment to maintain the absolute length and number of lines of a page. Because of this adjustment subscript or superscript characters may in the worst case, be printed improperly.

[PROGRAM EX.]

```
2000 LPRINT
2010 ESC$=CHR$(27)
2020 LPRINT ESC$;"E";ESC$;"G";"Y=AX";
2030 LPRINT ESC$;"F";
2040 LPRINT ESC$;"S";CHR$(0);CHR$(15);"3";
2050 LPRINT ESC$;"T";CHR$(18);
2070 LPRINT ESC$;"E";ESC$;"H";"+BX";
2075 LPRINT ESC$;"F";
2080 LPRINT ESC$;"S";CHR$(0);CHR$(15);"2";
2090 LPRINT ESC$;"T";CHR$(18);
2100 LPRINT ESC$;"E";ESC$;"H";"+CX+D";
2110 LPRINT ESC$;"F"
```

[PRINT]

$Y=AX^3+BX^2+CX+D$

i. ESC T
The ESC T code cancels the superscript/subscript character mode, but leaves the double print mode. To reset the double print mode, the ESC H code must be input.

j. ESC W+(n)D(for double-width enlarged character set/reset) (n=0 or 1)
When the ESC W+(1)Dcode is input, all the data following this code will be printed out in double-width enlarged charactgers. This code is cancelled upon input of the ESC W+(0)D (but cannot be cancelled by "DC 4" code or "LF" code).
The ESC W+(O)D code cancels the double-width enlarged character mode set by the ESC W+(1)D code. However, this code cannot cancel the enlarged character mode set by the SO code.
When the ESC W+(1)D code is input in the enlarged character mode set by the input of the SO code, or the SO code is input in the enlarged character mode set by the ESC W+(1)D code. ESC W+ (1)D takes precedence over SO. To cancel the enlarged character mode in this case, the ESC W+(O)D code must be entered.

k. ESC – (minus)+(n)D (for underline print mode set/reset) (n = 0 or 1) Input of the ESC – (minus)+(1)D code places the Printer in the underline print mode. All the data following this code will be printed with an underline. The ESC – (minus)+(0)D code cancels the underline print mode.

[PROGRAM EX.]

```
300 LPRINT "ESC - +N  UNDER LINE"
310 ESC$=CHR$(27)
320 GOSUB 410
330 LPRINT CHR$(15);
340 GOSUB 420
350 LPRINT CHR$(18);
360 LPRINT ESC$;"E";
370 GOSUB 410
380 LPRINT ESC$;"F";
388 LPRINT
390 STOP
410 LPRINT "     normal";
420 LPRINT ESC$;"-";CHR$(1);
430 LPRINT "underlined printing";
440 LPRINT ESC$;"-";CHR$(0);
450 LPRINT "normal"
460 RETURN
```

[PRINT]

```
ESC - +N  UNDER LINE
     normalunderlined printingnormal
underlined printingnormal
     normalunderlined printingnormal
```

5. Other codes

a. ESC @ (Printer initialization)
Input of the ESC @ code causes the Printer to be initialized.

b. ESC 8 (Escape 8) (to ignore the Paper End Detector)
The ESC 8 code makes it possible to transmit data even if there is no paper in the Printer. Since this code causes the PE signal to be ignored, data may be printed to the last page of the form without waste of paper. With the DIP switch pin 1—3 on the main circuit board set in the ON position, the Printer is placed in the ESC 8 condition upon application of power.

c. ESC 9 (Escape 9)
This code cancels the ESC 8 condition, and reinstates the PE signal. Therefore, the printer cannot receive data when there is no paper. With the DIP switch pin 1—3 set in the OFF position, the Printer is placed in the ESC 9 condition upon application of power.

d. BEL (Bell)
When the BES code is input, the buzzer sounds for about 0.3 second. Optional use of this code is recommended to arouse the attention of the operator.

e. BS(Backspace)
When the BS code is input, the data stored in the buffer is printed and the buffer pointer is decremented by 1. The next character will overstrike the last character printed. In the enlarged character mode, BS is effective only for the last byte.

[PROGRAM EX.]

```
52 LPRINT "ABCDE";CHR$(8);"0123"
```

[PRINT]

```
ABCDE123
```

[PROGRAM EX. 2]

```
56 LPRINT "ABCDE";CHR$(8);CHR$(8);"01234"
```

[PRINT]

```
ABC0E234
```

f. DEL (Delete)
Input of the DEL code causes the last byte stored in the print buffer to be cleared.

g. NUL (Null)
The NUL code is regarded as the termination for tabulation setting sequence unidirectional print mode and underline mode. The lack of the NUL code would cause incorrect data printout.

h. ESC K
Input of this code in the Text Mode causes the Printer's operation mode to be converted from Text to Normal-density Bit Image.

i. ESC L
Input of this code in the Text Mode causes the Printer to perform dual-density bit image printing. Refer to paragraph.

j. ESC U + (n)D (n = 0 or 1)
When the ESC U + (1)D code is input, printing of all the data following this code will be performed unidirecitonally with the print head moving from the left to the right.
The ESC U + (0)D code cancels the unidirectional printing mode.
Use of this code for printing graphs and charts in the unidirectional printing mode assures more accurate printing start position with better printing quality.

k. ESC #
Acept eighth bit "as is" from computer.

l. ESC 4
Italic character Set ON.

m. ESC 5
Italic character Set OFF.

n. ESC <
One line unidirectional Print. Prints current line only from left to right.

o. ESC =
Clears eighth bit (i.e. Sets to zero.)

p. ESC >
Sets eighth bit to 1.

6. Control Codes in the Bit Image Mode

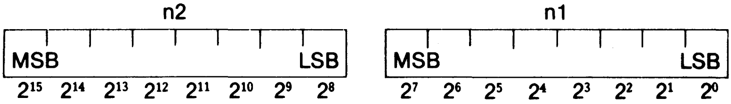
Most of the abovementioned control codes are normally used in the text mode. Control codes associated with the Bit Image mode will be discussed next.

a. Normal-density bit image mode setting by ESC K + n1 + n2

To convert the printer's operation mode from Text to Normal-density Bit Image, the "ESC K + n1 + n2" code must be input. (Here, the sign " + " is inserted for the purpose of legibility only and should not be input in actual operation.) Namely, when ESC [(27)D or (155)D] and K [(75)D] codes and data n1 and n2 are input, the Printer recognizes the data following the "ESC K" as the bit image data. n1 and n2 are the decimal numbers each consisting of 2 digits which define the amount of the bit image data to be transferred. n1 represents the low-order two digits while n2 represents the high-order two digits.

In the normal-density bit image processing, the maximum number of dot positions printable per line is 640. Therefore, the values of n1 and n2 specified in excess of 640 dot positions are ignored and printing of the bit image data after the 640th dot position is not guaranteed. Mixing of text data and bit image data is possible on the same line.

Note: Assign values to n1 and n2, respectively as follows.

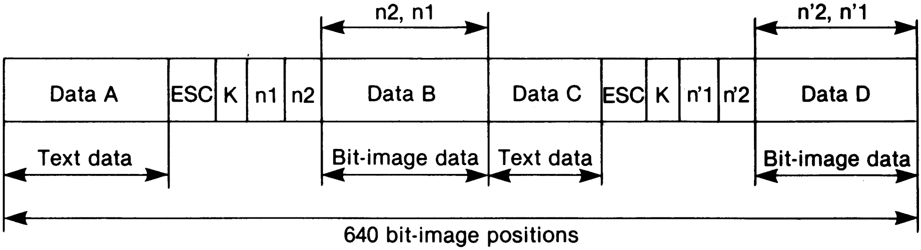


As shown above. n1 is set decimally as low-order bytes and n2 as high-order byte.

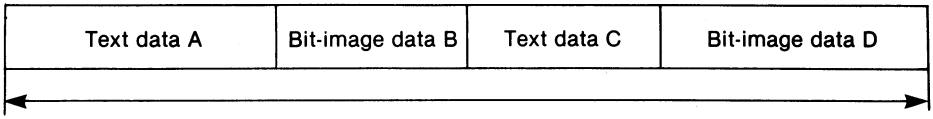
Text (20 characters)	ESC	K	n = 640 Bit-image data	Next data

20 characters in text mode correspond to 160 bit-image positions (20 × 8 = 160) So the remaining printable positions in Bit-image mode are 480 (640 − 160 = 480) If 640 data are input as bit-image mode characters, the first 480 data can be printed but the remaining 160 data are ignored and thus not printed.

(Ex. 2) Input data



Printing



(Ex. 3) Bit image data transfer by standard BASIC program to check for proper conversion to the Normal-density Bit Image mode, execute the following program.

[PROGRAM EX.]

```
4000 LPRINT CHR$(27);"2"
4010 LPRINT "GRAPHIC MODE (ESC +K)"
4020 LPRINT CHR$(27);"A";
4030 LPRINT CHR$(7);
4040 FOR K=1 TO 5
4050 LPRINT CHR$(27);"K";
4060 LPRINT CHR$(120);CHR$(0);
4070 FOR KO=1 TO 120
4080 LPRINT CHR$(&HFF);
4090 NEXT KO
4100 LPRINT
4110 NEXT K
```

[PRINT]

```
GRAPHIC MODE (ESC +K)
```

b. Dual-density bit image mode setting by ESC L + n1 + n2

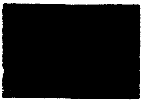
When the ESC [(27)D or (155)D] and L [(76)D] codes followed by data n1 and n2 are input, the printer's operation mode is converted from Text to Dual-density Bit Image. The transfer sequence of bit image data is the same as with the ESC K (normal-density bit image printing), but bit image printing can be performed in twice the dot density in the horizontal direction as with the ESC K. In other words, bit image data can be printed in 1280 dot position per line, thus permitting to produce denser graphic data.

[PROGRAM EX.]

```
4200 LPRINT CHR$(27);"2"
4210 LPRINT "GRAPHIC MODE (ESC +L)"
4220 LPRINT CHR$(27);"A";
4230 LPRINT CHR$(7);
4240 FOR L=1 TO 5
4250 LPRINT CHR$(27);"L";
4260 LPRINT CHR$(120);CHR$(0);
4270 FOR LO=1 TO 120
4280 LPRINT CHR$(&HFF);
4290 NEXT LO
4292 LPRINT
4294 NEXT L
```

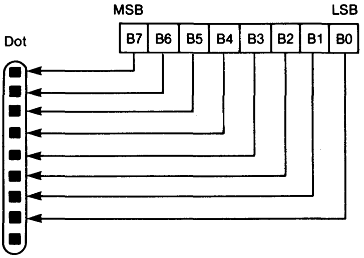
[PRINT]

```
GRAPHIC MODE (ESC +L)
```



c. Relationship between data an dot wires

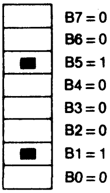
Fig. 13 shows the relationship between the Bit Image data and the dot tips in the print head. You can control arbitrary 8 dot tips in the rpint head.



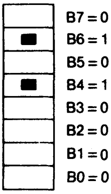
NOTE:
In the Bit Image mode, the 9th dot wire cannot be used.

Fig. 13 Relationship between Data and Dot Tips

If a bit is 1, the print head fires. If a bit is 0, the print head does not fire. For example, assume that data are given as follows:



(34)D



(80)D

where a box with "■" denotes the bit 1 and a blank box denotes the bit 0. According to **Appendix A** Code Table, you can define (00100010)2 as (34)D and (01010000)2 as (80)D.

As you can see the first 4 bits are defined from column and the second 4 bits are defined from row. Namely, (0101)2 = (5)D and (0000)2 = (0)D.

d. How to obtain n1 and n2

In the Printer, you have to send the number of data by n1 + n2 in hexadecimal numbers following the ESC K or ESC L. If the number of bit image data is 300, then n1 and n2 may be derived as follows:

n1 = (Number of data) MOD 256
= 300 mod 256
= (44)D
= < 2C > H

n2 = INT (Number of data/256)
= INT (300/256)
= (1)D
= < 01 > H

You can also use **Appendix B** Code Table, to find the coresponding hexadecimal numbers to the decimal numbers. The schematic of data transfer sequence in the Bit Image mode is shown in **Fig. 14.**

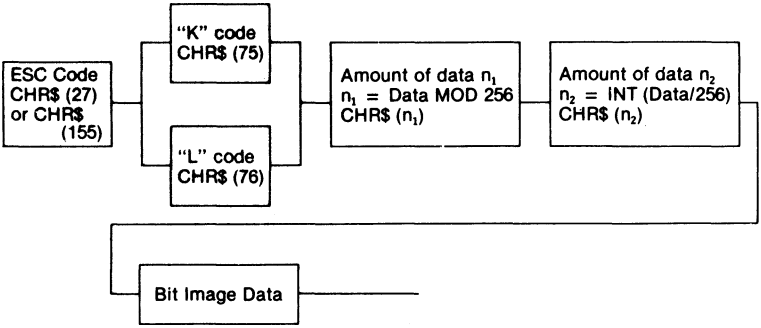

ESC Code CHR$ (27) or CHR$ (155)
"K" code CHR$ (75)
"L" code CHR$ (76)
Amount of data n_1 n_1 = Data MOD 256 CHR$ (n_1)
Amount of data n_2 n_2 = INT (Data/256) CHR$ (n_2)
Bit Image Data

Fig. 14 Data Transfer Sequence in Bit Image Mode

e. programming examples

(1) Dual-density bit image printing

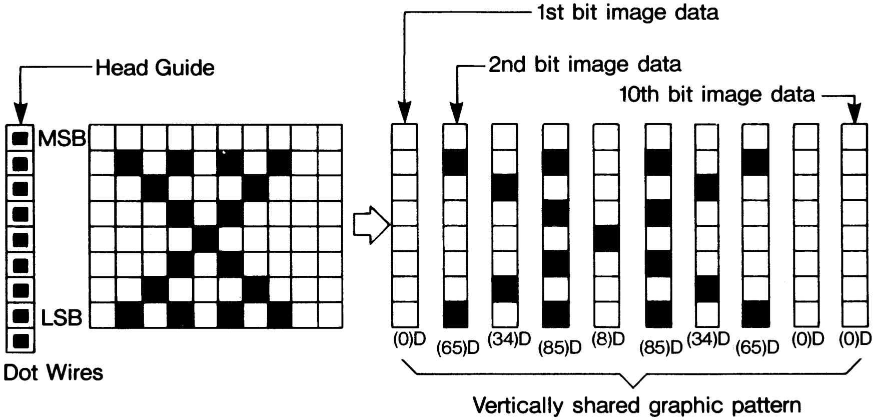


Fig. 15 Example of Graphic Pattern Formation

Note: The most significant bit (MSB) of the bit image data corresponds to the dot wire at the uppermost position.

For example, to print a graphic data as shown in **Fig. 15** a program such as shown on the next page must be executed. However, this program has been developed using standard BASIC language. If extended BASIC is to be used, the program must be changed according to the feaures of the language.

In addition, if data is to be transferred through an interpreter of BASIC, etc., the data transfer rate is extremely slow. In such a case, it is recommended to effect the data transfer through machine language, etc.

[PROGRAM EX.]

```
10 REM Bit Image Printing (DUAL DENSITY)
20 LPRINT CHR$(27);"L";CHR$(10);CHR$(128);
30 FOR I=1 TO 10
40 READ R
50 LPRINT CHR$(R);
60 NEXT I
70 LPRINT
80 DATA 0,65,34,85,8,85,34,65,0,0
90 END
```

[PRINT]

(2) Normal-density bit image printing

[PROGRAM EX.]

```
10 REM Bit Image Printing (NORMAL DENSITY)
20 LPRINT CHR$(27);"K";CHR$(10);CHR$(128);
30 FOR I=1 TO 10
40 READ R
50 LPRINT CHR$(R);
60 NEXT I
70 LPRINT
80 DATA 0,65,99,85,73,85,99,65,0,0
90 END
```

[PRINT]

APPENDIX A

ASCII CHART

		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	▬ 16	SP 32	0 48	@ 64	P 80	‘ 96	p 112	NUL 128	♥ 144	SP 160	0 176	@ 192	P 208	‘ 224	p 240
1	0001	— 1	■ 17	! 33	1 49	A 65	Q 81	a 97	q 113	£ 129	♦ 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	0010	— 2	DC 2 18	" 34	2 50	B 66	R 82	b 98	r 114	·· 130	DC2 146	" 162	2 178	B 194	R 210	b 226	r 242
3	0011	— 3	| 19	# 35	3 51	C 67	S 83	c 99	s 115	, 131	♣ 147	# 163	3 179	C 195	S 211	c 227	s 243
4	0100	▬ 4	DC 4 20	$ 36	4 52	D 68	T 84	d 100	t 116	· 132	DC4 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	0101	▬ 5	| 21	% 37	5 53	E 69	U 85	e 101	u 117	§ 133	¬ 149	% 165	5 181	E 197	U 213	e 229	u 245
6	0110	▬ 6	| 22	& 38	6 54	F 70	V 86	f 102	v 118	┌ 134	├ 150	& 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	▮ 23	39	7 55	G 71	W 87	g 103	w 119	BEL 135	┤ 151	’ 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	▮ 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	┬ 152	(168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	▮ 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	└ 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	◢ 26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	┘ 154	* 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	1100	FF 12	◣ 28	, 44	< 60	L 76	\ 92	l 108	: 124	FF 140	| 156	, 172	< 188	L 204	\ 220	l 236	: 252
D	1101	CR 13	◥ 29	– 45	= 61	M 77	] 93	m 109	} 125	CR 141	— 157	— 173	= 189	M 205	] 221	m 237	} 253
E	1110	SO 14	◤ 30	• 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	┴ 158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	1111	SI 15	♠ 31	/ 47	? 63	O 79	— 95	o 111	DEL 127	SI 143	+ 159	/ 175	? 191	O 207	— 223	o 239	DEL 255

		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
DEC																	
0	0	NUL	■	SP	0	@	P	‘	p	NUL	♥	SP	0	@	P	‘	p
1	1	—	■	!	1	A	Q	a	q	£	♦	!	1	A	Q	a	q
2	2	—	DC2	"	2	B	R	b	r	··	DC2	"	2	B	R	b	r
3	3	▬	|	#	3	C	S	c	s	,	♣	#	3	C	S	c	s
4	4	▬	DC4	$	4	D	T	d	t	·	DC4	$	4	D	T	d	t
5	5	▬	▮	%	5	E	U	e	u	§	┐	%	5	E	U	e	u
6	6	▬	▮	&	6	F	V	f	v	┌	├	&	6	F	V	f	v
7	7	BEL	▮	’	7	G	W	g	w	BEL	┤	’	7	G	W	g	w
8	8	BS	▮	(	8	H	X	h	x	BS	┬	(	8	H	X	h	x
19	9	HT	▮	)	9	I	Y	i	y	HT	└	)	9	I	Y	i	y
10	A	LF	◢	*	:	J	Z	j	z	LF	┘	*	:	J	Z	j	z
11	B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	K	[	k	{
12	C	FF	◣	,	<	L	\	l	:	FF	|	,	<	L	\	l	:
13	D	CR	◥	—	=	M	]	m	}	CR	—	—	=	M	]	m	}
14	E	SO	◣	.	>	N	^	n	~	SO	┴	,	>	N	^	n	~
5	F	SI	♠	/	?	O	—	o	DEL	SI	+	/	?	O	—	o	DEL

Appendix B

Control Codes

	Dec	Hex	Symbol	Function	Page
%	0	00	NUL	Follows <ESC> “D” as terminator for TABS	28
	7	07	BEL	Sounds buzzer for 1/3 second. Paper out rings for 3 seconds	27
	8	08	BS	Backspace. Empties printer buffer, then backspaces print head one space	28
	9	09	HT	Horizontal Tabulation. Print head moves to next tab stop	16
	10	0A	LF	LIne Feed. Printer empties its buffer and does line feed at current line spacing and Resets buffer pointer to zero	15
%	11	0B	VT	Vertical Tab — does single line feed	15
%	12	0C	FF	Advances paper to next logical TOF (top of form)	15,20
	13	0D	CR	Cariage Return. Prints buffer contents and resets buffer character count to zero	15
	14	0E	SO	Shift Out. Turns on double width mode to end of line unless cancelled by DC4 (20)	22
	15	0F	S1	Shift In. Turns on compressed character mode. Does not work with emphasized mode. Stays on until cancelled by DC2 (18)	23
%	18	12	DC2	Turns off compressed characters and empties buffer	23
%	20	14	DC4	Turns off double width mode (shift out only)	23
	27	1B	ESC	ASCII code for ESCAPE. Prepares printer to receive control codes	10
<ESC>	35	23	#	Accepts eighth bit “as is” from computer	28
<ESC>	45	2D	—	Underline mode. N=0 turns underline OFF. N>0 turns underline ON Format: <ESC> “—” N	26
<ESC>	48	30	0	Sets line spacing to 1/8″	19
<ESC>	49	31	1	Sets line spacing to 7/72″	19
<ESC>	50	32	2	Returns line spacing to default of 1/6″	20
<ESC>	51	33	3	Sets line spacing to N/216″. Stays on until changed Format: <ESC> “3” N, 1 < =N < =255.	20
<ESC>	52	34	4	Italic character set ON	28
<ESC>	53	35	5	Italic character set OFF	29
<ESC>	56	38	8	Ignores “paper out” sensor	27
<ESC>	57	39	9	Enables “paper out” sensor	27
<ESC>	60	3C	<	One line unidirectional print. Prints current line only from left to right	29

	Dec	Hex	Symbol	Function	Page
<ESC>	61	3D	=	Clears eighth bit. (i.e. sets to zero.)	29
<ESC>	62	3E	>	Sets eighth bit to 1	29
<ESC>	64	40	@	Resets all special modes to power up state including Top Of Form	27
<ESC>	65	41	A	Sets spacing of LF (line feed) to N/72″ Format: <ESC> “A” N, 1 < =N < =85.	18
<ESC>	67	43	C	Sets form length (FL) to N lines. Default is 66 Format: <ESC> “C” N, 1 < =N < =127. Resets top of form.	20
<ESC>	67	43	C	Sets form length (FL) to N inches. Default is 11 Format: <ESC> “C” 0 N, 1 < =N < =22. Resets top of form.	20
<ESC>	68	44	D	Reset current tabs and sets up to 28 HT (horiz tabs) TABs may range up to maximum width for character and printer size. E.G. Maximum TAB for normal characters CP-80 is 80. Format: <ESC> “D” N1 N2 N3 ... NN 0. Terminate TAB sequence with zero or 142	16
<ESC>	69	45	E	Turns on emphasized mode. Can’t mix with superscript, subscript, or compressed modes	24
<ESC>	70	46	F	Turns off emphasized mode	24
<ESC>	71	47	G	Turns on double strike mode	25
<ESC>	72	48	H	Turns off double strike mode, superscript, and subscript modes	25
<ESC>	74	4A	J	Sets line spacing to N/216″ for one line only and when received causes contents of buffer to print Format: <ESC> “J” N, 1 < =N < =255.	22
<ESC>	75	4B	K	Sets dot graphics mode to 640 dots per 7.5 line Format: <ESC> “K” N1 N2, N1 and N2 determine line length. Line length =N1 + 256°N2. 1 < =N1 < =255. 0 < =N2 < =255.	28,29
<ESC>	76	4C	L	Sets dot graphics mode to 1280 dots per 7.5 line.... Format: <ESC> “L” N1 N2, N1 and N2 determine line length. Line length =N1 + 256°N2. 1 < =N1 < =255. 0 < =N2 < =255.	28,31
<ESC>	78	4E	N	Sets skip over perforation to N lines Format: <ESC> “N” N, 1 < =N < =127.	21
<ESC>	79	4F	O	Resets skip over perforation to 0 lines	22
<ESC>	81	~~5B~~ 51	Q	Sets column width Format: <ESC> “Q” N, 1 < =N <maximum number (142) of characters/line.	17
<ESC>	83	~~5D~~ 53	S	Sets superscript/subscript modes Format: <ESC> “S” N, N=0 = > superscript, N > 0 = > subscript.	25

	Dec	Hex	Symbol	Function	Page
<ESC>	84	~~5E~~ 54	T	Resets superscript, subscript, and unidirectional printing (does not turn off double strike from script modes)	26
<ESC>	85	~~5F~~ 55	U	Unidirectional printing. Prints each line from left to right Format: <ESC> "U" N, N=0=> OFF, N > 0=> ON.	28
<ESC>	87	~~61~~ 57	W *	Double width printing. Stays ON until turned OFF Format: <ESC> "W" N, N=0=> OFF, N > 1=> ON. Has precedence over Shift Out (SO=CHRS (14)).	26
	127	7F	DEL	Deletes last character in printer buffer.	
	128	80	NUL	Follows <ESC> "D" as terminator for TABS	
	135	87	BEL	Sounds buzzer for 1/3 second. Paper out rings for 3 seconds.	
	136	88	BS	Backspace. empties printer buffer, then backspaces print head one space.	
	137	89	HT	Horizontal Tabulation.	
	138	8A	LF	Line Feed.	
	140	8B	VT	Vertical Tab — does single line feed.	
	141	8C	FF	Advances paper to TOF (Top Of next Form).	
	142	8D	CR	Carriage Return.	
	143	8E	SO	Shift Out. Turns on double width. Turns OFF at end of line.	
	144	8F	S1	Shift In. Turns on compressed character mode. Does not work with emphasized mode.	
	146	92	DC2	Turns off compressed characters.	
	148	94	DC4	Turns off double width mode. (Shift out only)	
	155	9B	ESC	ASCII code for ESCAPE.	
	255	FF	DEL	Deletes last character in printer buffer.	

Note: Numbers flagged with a % may require the addition of 128 to make work reliably. When in doubt, add 128.

Appendix C

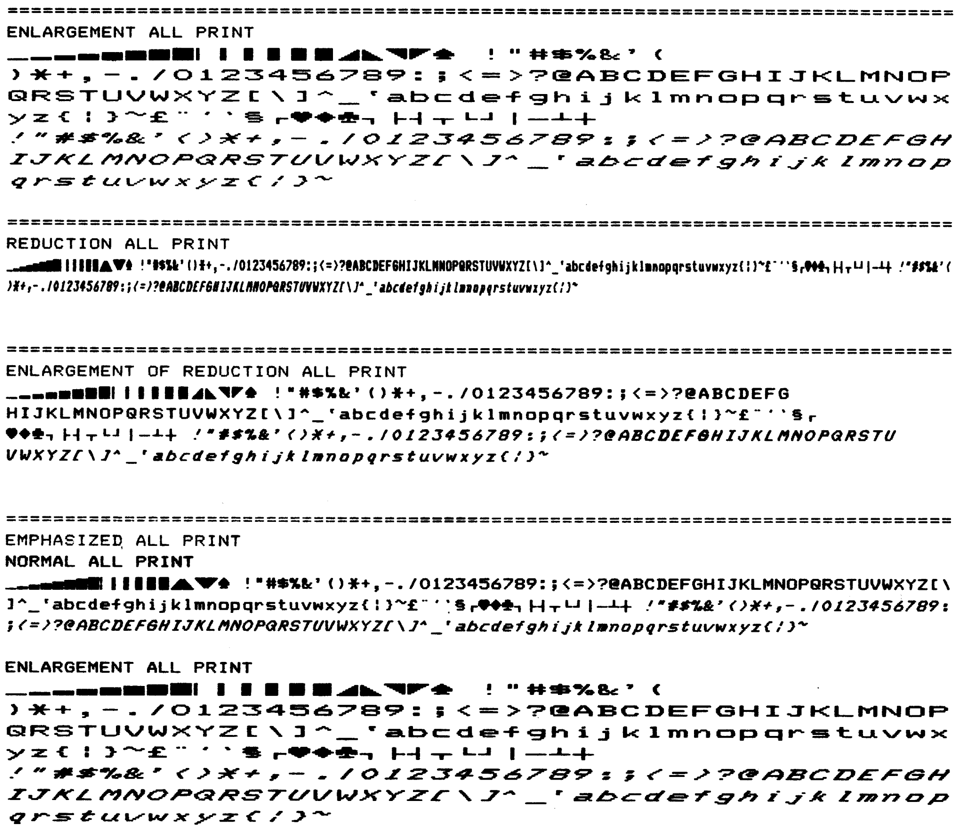
Control Key Table

What to Type	Dec	Hex	Char
ctrl @	0	00	NUL
ctrl A	1	01	SOH
ctrl B	2	02	STX
ctrl C	3	03	ETX
ctrl D	4	01	EOT
ctrl E	5	05	ENQ
ctrl F	6	06	ACK
ctrl G	7	07	BEL
ctrl H or ←	8	08	BS
ctrl I	9	09	HT
ctrl J	10	0A	LF
ctrl K	11	0B	VT
ctrl L	12	0C	FF
ctrl M or RETURN	13	0D	CR
ctrl N	14	0E	SO
ctrl O	15	0F	SI
ctrl P	16	10	DLE
ctrl Q	17	11	DC1
ctrl R	18	12	DC2
ctrl S	19	13	DC3
ctrl T	20	14	DC4
ctrl U or ←	21	15	NAK
ctrl V	22	16	SYN
ctrl W	23	17	ETB
ctrl X	24	18	CAN
ctrl Y	25	19	EM
ctrl Z	26	1A	SUB
ESC	27	1B	ESC
n/a	28	1C	FS
ctrl shift-M	29	1D	GS
ctrl	30	1E	RS
n/a	31	1F	US

Note: This is the standard on most keyboards that have the control key.

APPENDIX D

Printing Samples



```
================================================================================
ENLARGEMENT ALL PRINT
▁▂▃▄▅▆▇█▌ ▌▌▌▌▌█◢◣◥◤♠  ! " #$%&' (
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
QRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwx
yz{¦}~£¨''§┌♥♦♣┐├┤┬└┘│─┴┼
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnop
qrstuvwxyz{¦}~

================================================================================
REDUCTION ALL PRINT
▁▂▃▄▅▆▇█▌▌▌▌▌▌█▲▼♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{¦}~£¨''§┌♥♦♣┐├┤┬└┘│─┴┼ !"#$%&'(
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{¦}~


================================================================================
ENLARGEMENT OF REDUCTION ALL PRINT
▁▂▃▄▅▆▇█▌▌▌▌▌▌█◢◣◥◤♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG
HIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{¦}~£¨''§┌
♥♦♣┐├┤┬└┘│─┴┼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
VWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{¦}~


================================================================================
EMPHASIZED ALL PRINT
NORMAL ALL PRINT
▁▂▃▄▅▆▇█▌▌▌▌▌▌█▲▼♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
]^_'abcdefghijklmnopqrstuvwxyz{¦}~£¨''§┌♥♦♣┐├┤┬└┘│─┴┼ !"#$%&'()*+,-./0123456789:
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{¦}~

ENLARGEMENT ALL PRINT
▁▂▃▄▅▆▇█▌ ▌▌▌▌▌█◢◣◥◤♠  ! " #$%&' (
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
QRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwx
yz{¦}~£¨''§┌♥♦♣┐├┤┬└┘│─┴┼
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnop
qrstuvwxyz{¦}~
```

```
=========================================================================================
DOUBLE STRIKE ALL PRINT
NORMAL ALL PRINT
▁▂▃▄▅▆▇█▏▎▍▌▋▊▉◢◣◥◤♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
]^_'abcdefghijklmnopqrstuvwxyz{|}~£¨''$┌♥♦♣┐├┤┬└┘|─┴┼ !"#$%&'()*+,-./0123456789:
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~

ENLARGEMENT ALL PRINT
▁▂▃▄▅▆▇█▏▎▍▌▋▊▉◢◣◥◤♠  ! " # $ % & ' (
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z [ \ ] ^ _ ' a b c d e f g h i j k l m n o p q r s t u v w x
y z { | } ~ £ ¨ ' ' $ ┌ ♥ ♦ ♣ ┐ ├ ┤ ┬ └ ┘ | ─ ┴ ┼
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H
I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ ' a b c d e f g h i j k l m n o p
q r s t u v w x y z { | } ~

REDUCTION ALL PRINT
▁▂▃▄▅▆▇█▏▎▍▌▋▊▉◢◣◥◤♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~£¨''$┌♥♦♣┐├┤┬└┘|─┴┼ !"#$%&'(
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~


ENLARGEMENT OF REDUCTION ALL PRINT
▁▂▃▄▅▆▇█▏▎▍▌▋▊▉◢◣◥◤♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG
HIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~£¨''$┌
♥♦♣┐├┤┬└┘|─┴┼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
VWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~



=========================================================================================
NORMAL ALL PRINT
▁▂▃▄▅▆▇█▏▎▍▌▋▊▉◢◣◥◤♠ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
]^_'abcdefghijklmnopqrstuvwxyz{|}~£¨''$┌♥♦♣┐├┤┬└┘|─┴┼ !"#$%&'()*+,-./0123456789:
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~

=========================================================================================
*  E N L A R G E M E N T  *
* REDUCTION *
* ENLARGEMENT OF REDUCTION *

=========================================================================================
VARIOUS PRINTING MODES CAN BE MIXED
NORMALEMPHASIZEDSUB-SCRIPTSUB-SCRIPT & REDUCTIONNORMALSUB-SCRIPT
SUB-SCRIPT & REDUCTIONNORMAL
```

Appendix E

Internal Switches

Never set the 12 internal DIP (dual in-line pin) switches when the power is ON. Turn both the printer and computer OFF.

	SW2	SW1
FACTORY SET CONDITION		1-8 ON
		1-7 OFF
		1-6 ON
		1-5 OFF
	2-4 OFF	1-4 OFF
	2-3 OFF	1-3 OFF
	2-2 OFF	1-2 OFF
	2-1 OFF	1-1 OFF

Switch summary:

	ON	**OFF**
SW1-8	Select fixed	Select not fixed
SW1-7	Slashed zero	Regular zero
SW1-6	Buzzer on	Buzzer off
SW1-5	Emphasized	Normal
SW1-4	Italic	Normal
SW1-3	Paper out sensor off	Paper out sensor on
SW1-2	Not used	Not used
SW1-1	Compressed	Normal
SW2-4	1 inch skip over perforation	Normal
SW2-3	Auto LF with CR	LF must be from host
SW2-2	Not used	Not used
SW2-1	Not used	Not used

Appendix E

Switch Number	Normal Position	Function
1-8	ON	When the switch is ON, printer is permanently in the "selected" mode and no external command can "deselect" it. In the OFF position, it theoretically could be selected and deselected by external software codes. Since the printer does not recognize these codes, we leave it in the ON position. This refers to pin 36 on the connector. Some computers control this pin; if they do control the pin, SW should be OFF.
1-7	OFF	Allows the option of regular or slashed zero. If ON, slashed zero is printed. If OFF, regular zero is printed.
1-6	ON	If ON, buzzer will sound at ASCII 7 or paper-out signal. If OFF, buzzer will not sound at all.
1-5	OFF	Selects the default printing mode. OFF gives normal print characters. ON gives emphasized characters. Emphasized has priority over compressed mode (SW 1-1).
1-4	OFF	Determines the print font used. OFF gives normal characters. ON gives italic characters.
1-3	OFF	Affects paper out detection. With switch OFF, paper-out signal terminates printing. With switch ON, printing continues without paper (this will not work if computer monitors pin 12. PE signal will go high if SW 1-3 is ON).
1-2	OFF	Not used.
1-1	OFF	Determines default print width. OFF gives normal (10 CPI) character width. ON gives compressed (17.16 CPI) characters. Emphasized mode (SW 1-5) has priority over compressed mode.
2-4	OFF	When ON, gives automatic 1 inch skip over perforation. Great for readable program listings. When OFF, gives no skip over perforation.
2-3	OFF	Forces automatic LF with each CR. When OFF, LF must be provided via software as needed.
2-2	OFF	Not used.
2-1	OFF	Not used.

Appendix F

Connector Pin Chart

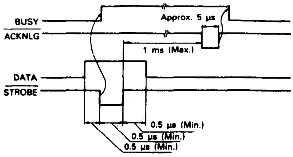
Connector use — Data exchange between the **CP-80** and an external computer (parallel).
Number of pins — 36
Part number — 57-30360 (AMPHENOL TYPE)
Pin assignment — Refer to the below table.

Signal Pin No.	Return Pin No.	Signal	Direction	Description
1	19	$\overline{\text{STROBE}}$	In	STROBE pulse of read data in. Pulse width must be more than 0.5 μs at receiving terminal. The signal level is normally "HIGH", read-in of data is performed at the "LOW" level of this signal.
2	20	DATA 1	In	These signals represent information of the 1st to 8th bits of parallel data respectively. Each signal is at "HIGH" level when data is logical "1" and "LOW" when logical "0".
3	21	DATA 2	In	
4	22	DATA 3	In	
5	23	DATA 4	In	
6	24	DATA 5	In	
7	25	DATA 6	In	
8	26	DATA 7	In	
9	27	DATA 8	In	
10	28	$\overline{\text{ACKNLG}}$	Out	Approx. 5μs pulse. "LOW" indicates that data has been received and that the printer is ready to accept other data.
11	29	BUSY	Out	A "HIGH" signal indicates that the printer cannot receive data. The signal becomes "HIGH" in the following cases: 1. During data entry 2. During printing operation 3. In OFF-LINE state 4. During printer error status.
12	30	PE	Out	A "HIGH" signal indicates that the printer is out of paper.
13	—	SLCT	Out	This signal indicates that the printer is in the selected state.
14	—	$\overline{\text{AUTO FEED XT}}$	In	With this signal being at "LOW" level, the paper is automatically fed one line after printing. (The signal level can be fixed to "LOW" withe DIP SW pin 2-3 provided on the control circuit board.)
15	—	NC		Not used.

Appendix F

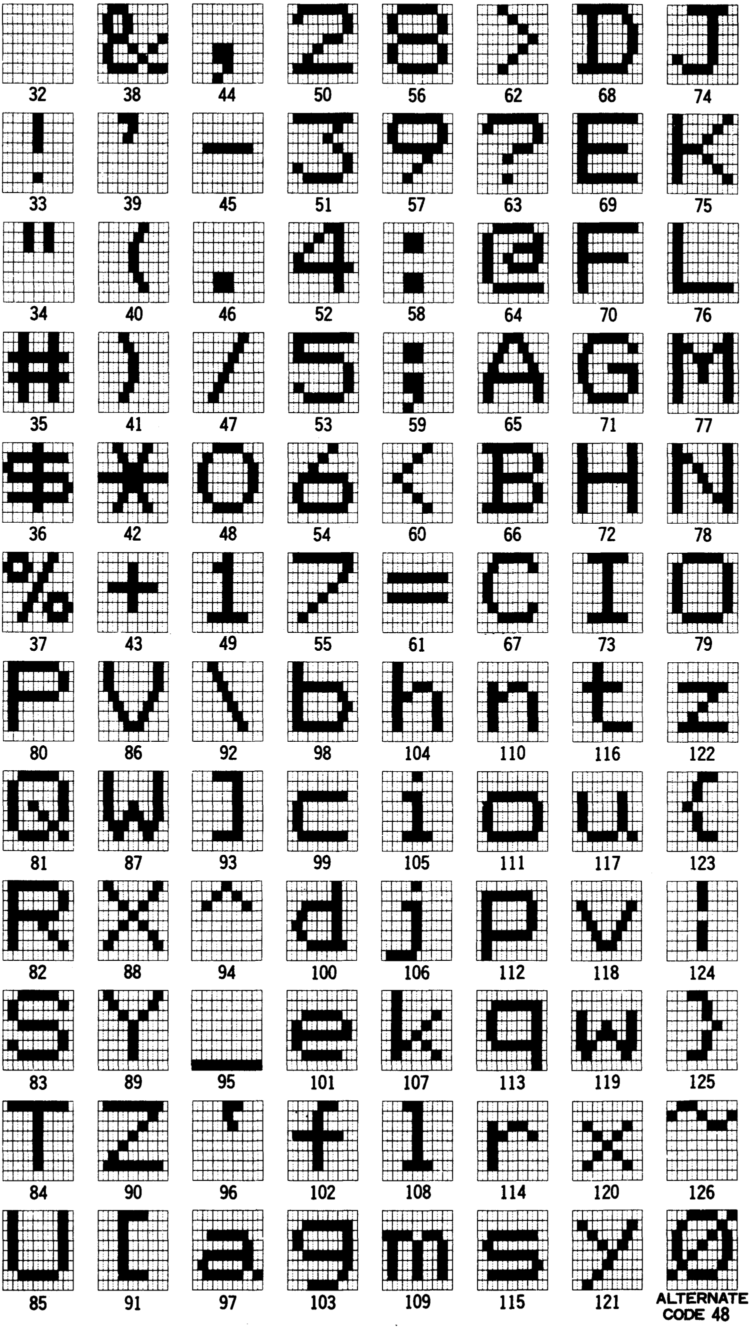
Signal Pin No.	Return Pin No.	Signal	Direction	Description
16	—	CHASSIS-GND	—	Printer chassis GND. In the printer, the chassis GND and the logic GND are isolated from each other.
18	—	NC	—	Not used.
19 to 30	—	GND	—	TWISTED-PAIR RETURN signal GND level.
31		$\overline{\text{INIT}}$	In	When the level of this signal becomes "LOW", the printer controller is reset to its initial state and the print buffer is cleared. This signal is normally at "HIGH" levle, and its pulse width must be more than 50μs at the receiving terminal.
32		$\overline{\text{ERROR}}$	Out	The level of this signal becomes "LOW" when the printer is in — 1. PAPER END state 2. OFF-LINE state 3. Error state
33		GND		Same as with Pin Nos. 19 to 30.
34		NC		Not used
35				Pulled up to +5V through 3.3kΩ resistance.
36		$\overline{\text{SLCT IN}}$	In	Data entry to the printer is possible only when the level of this signal is "LOW". (Internal fixing can be carried out with DIP SW pin 1-8. The condition at the time of shipment is set "LOW" for this signal.)

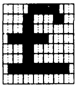
Notes:
1. "Direction" refers to the direction of signal as viewed from the printer.
2. "Return" denotes "TWISED PAIR RETURN" and is to be connected at signal ground level. As to the wiring for the interface, be sure to use a twisted-pair cable for each signal and never fail to complete connection on the Return side. To prevent noise effectively, these cables should be shielded and connected to the chassis of the host computer and the printer, respectively.
3. All interface conditions are based on TTL level. Both the rise and fall times of each signal must be less than 0.2μs.
4. Data transfer must not be carries out by ignoring the ACKNLG or BUSY signal. (Data transfer to this printer can be carried out only after confirming the ACKLG signal or when the level of the BUSY signal is "LOW".) Time chart is below.



APPENDIX G

Character Font

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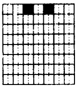
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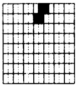
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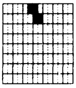
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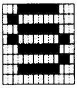
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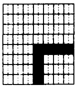
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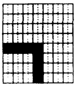
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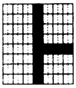
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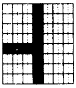
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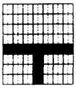
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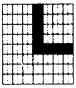
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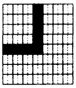
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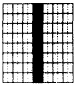
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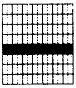
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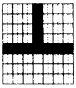
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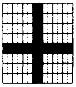
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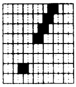
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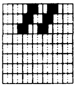
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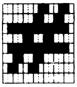
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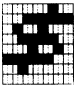
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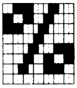
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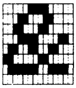
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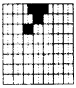
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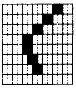
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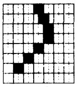
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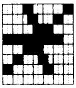
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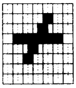
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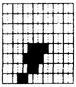
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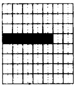
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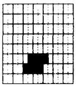
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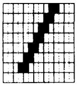
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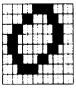
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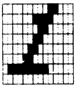
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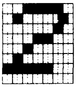
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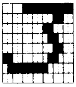
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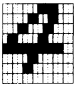
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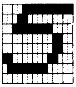
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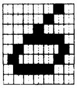
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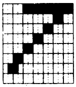
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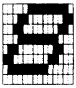
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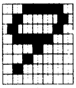
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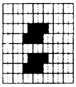
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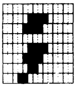
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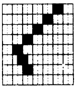
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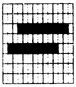
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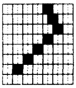
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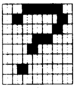
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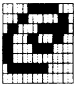
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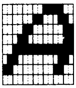
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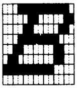
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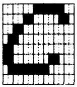
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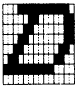
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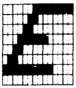
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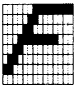
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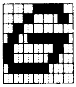
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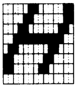
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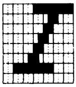
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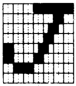
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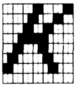
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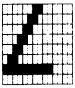
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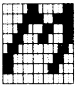
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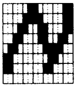
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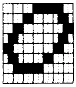
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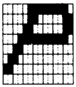
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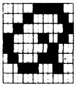
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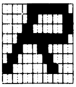
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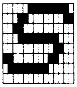
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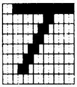
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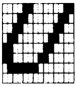
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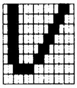
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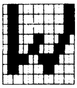
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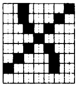
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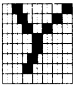
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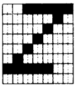
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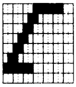
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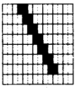
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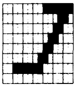
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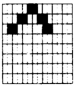
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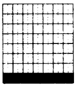
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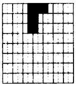
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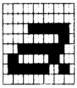
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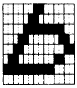
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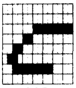
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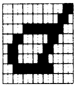
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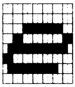
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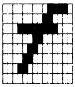
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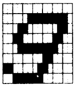
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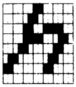
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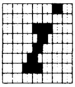
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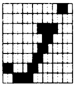
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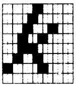
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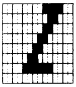
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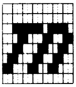
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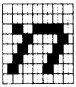
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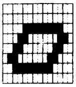
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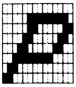
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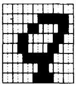
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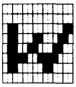
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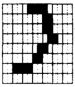
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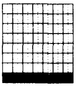
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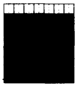
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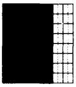
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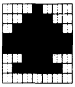
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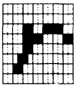
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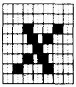
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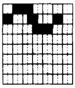
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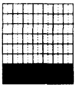
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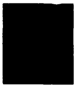
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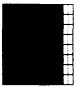
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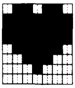
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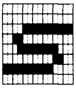
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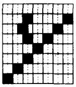
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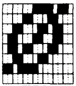
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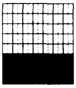
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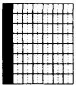
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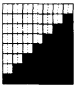
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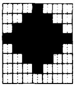
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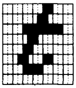
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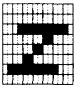
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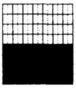
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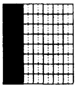
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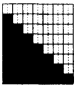
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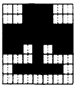
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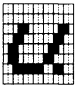
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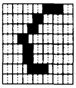
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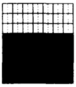
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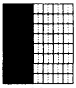
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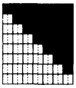
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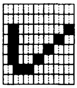
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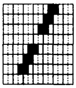
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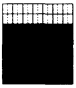
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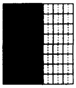
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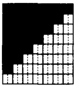
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